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#### EDUCATION

- 1983 Ph. D. in Physics, Massachusetts Institute of Technology.  
1970 B. S. with Distinction, Honors in Physics, University of Michigan, Ann Arbor.

#### EMPLOYMENT

- 2000– Principal Scientist, Astrophysics Element, JPL  
1993–2000 Research Scientist, Astrophysics Element, JPL  
1993–1994 Visiting Associate, California Institute of Technology  
1991–1993 Senior Research Associate, California Institute of Technology  
1986–1991 Senior Research Fellow, California Institute of Technology  
1983–1986 Research Fellow, California Institute of Technology  
1978–1983 Research Assistant, Massachusetts Institute of Technology  
1970–1977 Physics Teacher, Baltimore County Public Schools, MD

#### PROFESSIONAL ACTIVITIES

- 2007– Member, NASA Primordial Polarization Program Definition Team  
2003– Lead, Center for Longwavelength Astrophysics, JPL  
2000 Member of Organizing Committee, NASA Space Astrophysics Detector workshop  
1999 Chair, Infrared, Submillimeter, & Radio Detector Panel, ROSS-99 NRA evaluation  
1999–2002 Chair, JPL-Palomar Time Allocation Committee.  
1998–2004 Group Supervisor, Astrophysics Instruments Group (Div 32+38)  
1998– Deputy Project Scientist for SIRTF/Spitzer  
1998– Survey Scientist for Low Frequency Instrument on Planck,  
member of Planck Science Team  
1997–2000 Program Scientist for the Structure and Evolution of the Universe Program at JPL  
1997– Project Scientist, US Planck Project, and PI, US Low Frequency Instrument team  
1996–1997 Manager, Structure and Evolution of the Universe Program at JPL  
1996– Instrument Scientist for the SIRTF Infrared Spectrograph  
1996–2001 Member, NASA Structure and Evolution of the Universe Subcommittee.  
1995 Chair, Cosmology Panel, NASA ADP proposal review.  
1994–1999 PI, JPL-TAP Cryogenic HEMT Technology Program

1994–1999	Member, JPL-Palomar Time Allocation Committee.
1994	Visiting Scientist, Institute for Advanced Study, Princeton, NJ
1993–1996	Member, NASA ISRMOWG.
1992–1998	Member (Chair, 1995–1998), NSF review panel, Center for Astrophysical Research in Antarctica.
1992–1997	Study Scientist, NASA Submillimeter Mission.
1992–1997	Member, NASA Submillimeter Science Working Group.
1991–1994	Member, NASA Space VLBI Project Science Group.
1984–1988	Member, U.S. QUASAT science team.

#### AWARDS

2004	NASA Outstanding Leadership Medal for scientific and technical leadership in addressing and resolving major technical issues on Spitzer
1999	JPL Level A Leadership Award
1999	NASA Exceptional Achievement Medal for Development of the Cryogenic HEMT Optimization Program
1999	JPL Technical Excellence Award, MMIC Low Noise Amplifier Development Team

#### PUBLICATIONS

##### *Spitzer IRS mapping of the central kpc of Centaurus A*

Alice C. Quillen, Joss Bland-Hawthorn, Joel Green, J. D. Smith, D. Amelia Prasad, Almudena, Alonso-Herrero, Mairi H. Brookes, Kieran Cleary, & Charles R. Lawrence 2008, *MNRAS*, in press

##### *Joint Bayesian Component Separation and CMB Power Spectrum Estimation*

H. K. Eriksen, J. B. Jewell, C. Dickinson, A. J. Banday, K. M. Górski, C. R. Lawrence 2008, *Ap. J.*, in press

##### *The Joint Large-Scale Foreground-CMB Posteriors of the 3-year WMAP Data*

H. K. Eriksen, C. Dickinson, J. B. Jewell, A. J. Banday, K. M. Górski, C. R. Lawrence 2008, *Ap. J. Letters*, **672**, 87

##### *Making Maps from Planck LFI 30 GHz Data*

M. A. J. Ashdown, C. Baccigalupi, A. Balbi, J. G. Bartlett, J. Borrill, C. Cantalupo, G. de Gasperis, K. Gorski, V. Heikkilä, E. Hivon, E. Keihänen, H. Kurki-Suonio, C. R. Lawrence, P. Natoli, T. Poutanen, S. Prunet, M. Reinecke, R. Stompor, and B. Wandelt (The Planck CTP Working Group) 2007, *A&A*, **471**, 361

##### *Making Sky Maps from Planck Data*

M. A. J. Ashdown, C. Baccigalupi, A. Balbi, J. G. Bartlett, J. Borrill, C. Cantalupo, G. de Gasperis, K. Gorski, E. Hivon, E. Keihänen, H. Kurki-Suonio, C. R. Lawrence, P. Natoli, T. Poutanen, S. Prunet, M. Reinecke, R. Stompor, and B. Wandelt (The Planck CTP Working Group) 2007, *A&A*, **467**, 761

##### *Spitzer Observations of 3C Quasars and Radio Galaxies: Mid-Infrared Properties of Powerful Radio Sources*

K. Cleary, C. R. Lawrence, J. A. Marshall, L. Hao, and D. Meier 2007, *Ap. J.*, **660**, 117

*A Relation Between the Mid-Infrared [NeV] 14.3  $\mu$ m and [NeIII] 15.6  $\mu$ m Lines in Active Galactic Nuclei*

V. Gorjian, K. Cleary, M. W. Werner, and C. R. Lawrence 2007, *Ap. J.*, **655**, 73

*Bayesian Foreground Analysis with CMB Data*

H. K. Eriksen, C. Dickinson, C. R. Lawrence, C. Baccigalupi, A. J. Banday, K. M. Górski, F. K. Hansen, E. Pierpaoli, M. D. Seiffert 2006, *New Astronomy Reviews*, **50**, 861

*Spitzer Observations of Centaurus A: Infrared Synchrotron Emission from the Northern Lobe*

M. H. Brookes, C. R. Lawrence, D. Stern, V. Gorjian, M. Werner, and V. Charmandaris 2006, *Ap. J. Letters*, **646**, 41

*Spitzer Observations of the Dusty Warped Disk of Centaurus A*

Alice C. Quillen, Mairi H. Brookes, Jocelyn Keene, Daniel Stern, Charles R. Lawrence, Michael W. Werner 2006, *Ap.J.*, **645**, 1092

*Discovery of a 500 pc Shell in the Nucleus of Centaurus A*

Alice C. Quillen, Joss Bland-Hawthorn, Mairi H. Brookes, Michael W. Werner, J. D. Smith, Daniel Stern, Jocelyn Keene, Charles R. Lawrence 2006, *Ap. J.*, **641**, 29

*CMB Component Separation by Parameter Estimation*

H. K. Eriksen, C. Dickinson, C. R. Lawrence, C. Baccigalupi, A. J. Banday, K. M. Gorski, F. K. Hansen, P. B. Lilje, E. Pierpaoli, M. D. Seiffert, K. M. Smith, and K. Vanderlinde 2006, *Ap. J.*, **641**, 665

*Comparison of map-making algorithms for CMB experiments*

T. Poutanen, G. de Gasperis, E. Hivon, H. Kurki-Suonio, A. Balbi, J. Borrill, C. Cantalupo, O. Dore, E. Keihänen, C. R. Lawrence, D. Maino, P. Natoli, S. Prunet, R. Stompor, R. Teyssier 2006, *A&A*, **449**, 1311

*Silicate Emission in the Spitzer IRS2 spectrum of FSC 10214+4724*

H. I. Teplitz, L. Armus, B.T. Soifer, V. Charmandaris, J. A. Marshall, H. Spoon, C. Lawrence, L. Hao, S. Higdon, Y. Wu, M. Lacy, P. R. Eisenhardt, T. Herter, J.R. Houck 2006, *Ap. J. Letters*, **638**, 1311

*A Map of the Cosmic Microwave Background from the BEAST Experiment*

Peter R. Meinhold, Marco Bersanelli, Jeffrey Childers, Newton Figueiredo, Todd C. Gaier, Doron Halevi, Gregory G. Huey, Miikka Kangas, Charles R. Lawrence, Alan Levy, Philip M. Lubin, Marco Malaspine, Nazzareno Mandolcsi, Joshua Marvil, Jorge Mejía, Paolo Natoli, Ian O'Dwyer, Hugh O'Neill, Shane Parendo, Agenor Pina, Michael D. Seiffert, Nathan C. Stebor, Camilo Tello, Fabrizio Villa, Thyrso Villela, Lawrence A. Wade, Benjamin D. Wandelt, Brian Williams, and Carlos Alexandre Wuensche 2005, *Ap. J. Suppl.*, **158**, 101

*XMM-Newton observations of three high-redshift radio galaxies*

E. Belsole, D. M. Worrall, M. J. Hardcastle, M. Birkinshaw, C. R. Lawrence 2004, *MNRAS*, **352**, 924

*Spitzer/IRS Observations of the Redshift 3.91 Quasar APM 08279+5255*

B. T. Soifer, V. Charmandaris, B. R. Brandl, L. Armus, P. M. Apleton, M. J. Burgdorf, D. Devost, T. Herter, S. I. U. Higdon, J. L. Higdon, J. R. Houck, C. R. Lawrence, P. W. Morris, H. I. Teplitz, K. I. Uchida, J. van Cleve, D. Weedman 2004, *Ap. J. Suppl.*, **154**, 151

*The Infrared Spectrograph on the Spitzer Space Telescope*

J. R. Houck, T. L. Roellig, J. van Cleve, W. J. Forrest, T. Herter, C. R. Lawrence, K. Matthews, H. J. Reitsema, B. T. Soifer, D. M. Watson, D. Weedman, M. Huisjen, J. Troeltzsch, D. J. Barry, J. Bernard-Salas, C. E. Blacken, B. R. Brandl, V. Charmandaris, D. Devost, G. E. Gull, P. Hall, C. P. Henderson, S. J. V. Higdon, B. E. Pirger, J. Schoenwald, G. C. Sloan, K. I. Uchida, P. N. Appleton, L. Armus, M. J. Burgdorf, S. B. Fajardo-Acosta, C. J. Grillmair, J. G. Ingalls, P. W. Morris, H. I. Teplitz 2004, *Ap. J. Suppl.*, **154**, 18

*The Spitzer Space Telescope Mission*

M. W. Werner, T. L. Roellig, F. J. Low, G. H. Rieke, M. Rieke, W. F. Hoffmann, E. Young, J. R. Houck, B. Brandl, G. G. Fazio, J. L. Hora, R. D. Gehrz, G. Helou, B. T. Soifer, J. Stauffer, J. Keene, P. Eisenhardt, D. Gallagher, T. N. Gautier, W. Irace, C. R. Lawrence, L. Simmons, J. E. van Cleve, E. L. Wright, M. Jura, and D. P. Cruikshank 2004, *Ap. J. Suppl.*, **154**, 1

*Amplifier arrays for CMB polarization*

Todd Gaier, Charles R. Lawrence, Michael D. Seiffert, Mary Wells, Pekka Kangaslahti, Douglas Dawson 2003, *New Astronomy Reviews*, **47**, Issue 11-12, 1167-1171

*The Redshift of the Lensed Object in the Einstein Ring B0218+357*

Judith G. Cohen, Charles R. Lawrence, and Roger D. Blandford 2003, *Ap. J.*, **583**, 67.

*2016+112: a gravitationally lensed type II quasar*

L. V. E. Koopmans, M. A. Garrett, R. D. Blandford, C. R. Lawrence, A. R. Patnaik, R. W. Porcas 2002, *MNRAS*, **334**, 39.

*Chandra measurements of the X-ray core and cluster of 3C 220.1*

D. M. Worrall, M. Birkinshaw, M. J. Hardcastle, C. R. Lawrence 2001, *MNRAS*, **326**, 1127.

*A Measurement of Anisotropy in the Cosmic Microwave Background on 7'-22' Scales*

E. M. Leitch, A. C. S. Readhead, T. J. Pearson, S. T. Myers, S. Gulkis, C. R. Lawrence 2000, *ApJ*, **532**, 37.

*A Composite Radio Galaxy Spectrum from 800 to 1500 Angstroms*

P. J. McCarthy & C. R. Lawrence, submitted to *Ap. J.*.

*Extended and Compact Emission from the Powerful Radio Galaxy 3C 220.1*

M. J. Hardcastle, C. R. Lawrence, D. M. Worrall 1998, *Ap. J.*, **504**, 743

*Noise Performance of a Cryogenically Cooled 94 GHz InP MMIC Amplifier and Radiometer*

T. Gaier, M. Seiffert, P. Meinholt, P. Lubin, M. Sholley, R. Lai, H. Wang, B. Allen, B. Osgood, T. Block, P. H. Liu, C. Jackson, & C. R. Lawrence 1996, *SPIE Proceedings, Millimeter and Sub-millimeter III*, **2842**, 46.

*Direct Imaging of the CMB from Space*

M. A. Janssen, D. Scott, M. White, M. D. Seiffert, C. R. Lawrence, K. Górski, M. Dragovan, T. Gaier, K. Ganga, S. Gulkis, A. E. Lange, S. M. Levin, P. M Lubin, P. Meinholt, A. C. S. Readhead, P. L. Richards, & J. E. Ruhl 1996, submitted to *Ap. J.*

*Optical Spectra of a Complete Sample of Radio Sources*

C. R. Lawrence, J. R. Zucker, S. C. Unwin, T. J. Pearson, A. C. S. Readhead, and W. Xu 1996, *Ap. J. Suppl.*, **107**, 541.

*The Lensing Galaxy in MG 1549+3047*

J. Lehár, A. J. Cooke, C. R. Lawrence, A. D. Silber, & G. I. Langston 1996, *A. J.*, **111**, 1812.

*Global 3- and 7-mm VLBI Observations of OJ 287*

C. E. Tateyame, M. Inoue, T. P. Krichbaum, L B. Baath, S. Kameno, A. E. E. Rogers, A. Alberdi, D. C. Backer, N. Bartel, R. S. Booth, B. F. Burke, J. E. Carlstrom, V. Dhawan, R. L. Dickman, D. T. Emerson, H. Hirabayashi, M. W. Hodges, D. A. Graham, K. J. Johnston, H. Kobayashi, A. J. Kus, S. Padin, R. L. Plambeck, C. R. Predmore, A. Quirrenbach, C. R. Lawrence, J. Lamb, J. M. Marcaide, M. Morimoto, B. O. Rönnäng, I. I. Shapiro, J. H. Spencer, A. Witzel, D. Woody, & M. C. H. Wright 1996, *Publ. Astron. Soc. Japan*, **48**, 37.

*Absorption Lines in the Gravitational Lens System MG0414+0534*

C. R. Lawrence, J. L. Cohen, & J. B. Oke 1995, *A. J.*, **110**, 2583.

*MG0414+0534: A Dusty Gravitational Lens*

C. R. Lawrence, Richard Elston, B. T. Jannuzi, & E. L. Turner 1995, *A. J.*, **110**, 2570.

*A Measurement of the Sunyaev-Zel'dovich Effect in the Coma Cluster of Galaxies*

T. Herbig, C. R. Lawrence, A. C. S. Readhead, and S. Gulkis 1995, *Ap. J. Letters*, **449**, L5.

*New Redshifts of Radio Sources from the S4 and S5 Surveys*

W. Xu, C. R. Lawrence, A. C. S. Readhead, and T. J. Pearson 1994, *A. J.*, **108**, 395.

*Reduction of Ground Spillover in the Owens Valley 5.5 m Telescope*

C. R. Lawrence, T. Herbig, A. C. S. Readhead 1994, *Proceedings of the IEEE*, **82**, 763.

*Separation of Foreground Radiation from Cosmic Microwave Background Anisotropy Using Multi-frequency Measurements*

W. N. Brandt, C. R. Lawrence, A. C. S. Readhead, J. Pakianathan, and T. Fiola 1994, *Ap. J.*, **424**, 1.

*Near Infrared Images of MG1131+0456 with the W. M. Keck Telescope: Another Dusty Gravitational Lens?*

J. E. Larkin, K. Matthews, C. R. Lawrence, J. R. Graham, W. Harrison, G. Jernigan, S. Lin, J. Nelson, G. Neugebauer, G. Smith, B. T. Soifer, and C. Ziolkowsky 1994, *Ap. J. Letters*, **420**, L9.

*Extended and Compact X-Ray Emission in Powerful Radio Galaxies*

D. M. Worrall, C. R. Lawrence, T. J. Pearson, and A. C. S. Readhead 1994, *Ap. J. Letters*, **420**, L17.

*First  $\lambda = 7$  mm VLBI Observations of the Peculiar Superluminal Radio Source 4C39.25*

A. Alberdi, T. P. Krichbaum, A. Witzel, D. A. Graham, M. Inoue, M. Morimoto, R. S. Booth, B. O. Rönnäng, F. Colomer, A. E. E. Rogers, J. A. Zensus, A. C. S. Readhead, C. R. Lawrence, N. Bartel, I. I. Shapiro, and B. F. Burke 1993, *A. A.*, **271**, 93.

*Limits on the Anisotropy of the Microwave Background Radiation on Arc Minute Scales. II: The RING*

S. T. Myers, A. C. S. Readhead, and C. R. Lawrence 1993, *Ap. J.*, **405**, 8.

*A Gravitationally-Lensed Ring in MG 1549+3047*

J. Lehár, G. I. Langston, A. Silber, C. R. Lawrence, and B. F. Burke 1993, *A. J.*, **105**, 847.

*A K-band Image of the Gravitational Lens System 2016+112*

C. R. Lawrence, G. Neugebauer, and K. Matthews 1993, *A. J.*, **105**, 17.

*Observations of the Isotropy of the Cosmic Microwave Background Radiation*

A. C. S. Readhead and C. R. Lawrence 1992, *Ann. Rev. Astro. Astrophys.*, **30**, 653.

*Infrared Observations of the Gravitational Lens System 1422+231*

C. R. Lawrence, G. Neugebauer, N. Weir, K. Matthews, and A. R. Patnaik 1992, *M.N.R.A.S.*, **259**, P5.

*High Spatial-Resolution Continuum and H $\alpha$  Imaging of the High-Redshift IRAS Source FSC-10214+4724*

B. T. Soifer, G. Neugebauer, K. Matthews, C. R. Lawrence, and J. Mazzarella 1992, *Ap. J. Letters*, **399**, L55.

*A Gravitational Lens Candidate with an Unusually Red Optical Counterpart*

J. N. Hewitt, E. L. Turner, C. R. Lawrence, D. P. Schneider, and J. P. Brody 1992, *A. J.*, **104**, 968.

*The Evolution of the Sub-parsec Structure of 3C 84 at 43 GHz*

T. P. Krichbaum, A. Witzel, D. A. Graham, W. Alef, I. I. K. Pauliny-Toth, C. A. Hummel, A. Quirrenbach, M. Inoue, H. Harabayashi, M. Morimoto, A. E. E. Rogers, J. A. Zensus, C. R. Lawrence, A. C. S. Readhead, R. S. Booth, B. O. Rönnäng, A. J. Kus, K. J. Johnston, J. H. Spencer, B. F. Burke, V. Dhawan, N. Bartel, I. I. Shapiro, A. Alberdi, and J. M. Marcaide 1992, *A. A.*, **260**, 33.

*First- and Second-Epoch VLBI Observations of the Gravitational Lens System 2016+112*

M. B. Heflin, M. V. Gorenstein, C. R. Lawrence, and B. F. Burke 1991, *Ap. J.*, **378**, 519.

*Optical Polarization of a Complete Sample of Radio Sources*

C. D. Impey, C. R. Lawrence, and Tapia, S. 1991, *Ap. J.*, **375**, 46.

*Further 7 Millimeter VLBI Observations of 3C 84 and Other Sources with 100 Microarcsecond Angular Resolution 1990*

V. Dhawan, N. Bartel, A. E. E. Rogers, T. P. Krichbaum, A. Witzel, D. A. Graham, I. I. K. Pauliny-Toth, B. O. Rönnäng, H. Hirabayashi, M. Inoue, C. R. Lawrence, I. I. Shapiro, B. F. Burke, R. S. Booth, A. C. S. Readhead, M. Morimoto, K. J. Johnston, J. H. Spencer, and J. M. Marcaide 1990, *Ap. J. Letters*, **360**, L43.

*43 GHz VLBI Observations of 3C 273 after a Flux Density Outburst in 1988*

T. P. Krichbaum, R. S. Booth, A. J. Kus, B. O. Rönnäng, A. Witzel, D. A. Graham, I. I. K. Pauliny-Toth, A. Quirrenbach, C. A. Hummel, A. Alberdi, J. A. Zensus, K. J. Johnston, J. H. Spencer, A. E. E. Rogers, C. R. Lawrence, A. C. S. Readhead, H. Hirabayashi, M. Inoue, M. Morimoto, V. Dhawan, N. Bartel, I. I. Shapiro, B. F. Burke, and J. M. Marcaide 1990, *A. A.*, **237**, 3.

*Where Have All the Lenses Gone?*

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*A Limit on the Anisotropy of the Microwave Background Radiation on Arc Minute Scales*

A. C. S. Readhead, C. R. Lawrence, S. T. Myers, W. L. W. Sargent, H. E. Hardebeck, and A. T. Moffet 1989, *Ap. J.*, **346**, 566.

*The Ring Cycle: An Iterative Lens Reconstruction Technique Applied to MG1131+0456*

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*High Resolution CCD Imaging and Derived Gravitational Lens Models of 2237+0305*

D. P. Schneider, E. L. Turner, J. E. Gunn, J. N. Hewitt, M. Schmidt, and C. R. Lawrence 1988, *A. J.*, **95**, 1619.

*VLBI Imaging with an Angular Resolution of 100 microarcseconds*

N. Bartel, V. Dhawan, T. Krichbaum, D. A. Graham, I. I. K. Paulin-Toth, A. E. E. Rogers, B. O. Rönnäng, J. H. Spencer, H. Harabayashi, M. Inoue, C. R. Lawrence, I. I. Shapiro, B. F. Burke, J. M. Marcaide, K. J. Johnston, R. S. Booth, A. Witzel, M. Morimoto, and A. C. S. Readhead 1988, *Nature*, **334**, 131.

*The Sub-arcsecond Structure of MG1131+0456: An Einstein Ring Gravitational Lens?*

J. N. Hewitt, E. L. Turner, D. P. Schneider, B. F. Burke, G. I. Langston, and C. R. Lawrence 1988, *Nature*, **333**, 537.

*The Triple Radio Source 0023+171: A Candidate for a Dark Gravitational Lens*

J. N. Hewitt, E. L. Turner, C. R. Lawrence, D. P. Schneider, J. E. Gunn, C. L. Bennett, B. F. Burke, J. H. Mahoney, G. I. Langston, M. Schmidt, J. B. Oke, and J. G. Hoessel 1987, *Ap. J.*, **321**, 706.

*Spectroscopy of the Extra-Nuclear Line Emitting Regions Associated with the Gravitational Lens System 2016+112*

D. P. Schneider, J. E. Gunn, E. L. Turner, C. R. Lawrence, M. Schmidt, and B. F. Burke 1987, *A. J.*, **94**, 12.

*Isotropy of the Microwave Background Radiation Near 1146+111 B and C*

C. R. Lawrence, A. C. S. Readhead, A. T. Moffet, and M. Birkinshaw 1986, *A. J.*, **92**, 1235.

*An Apparent Gravitational Lens with an Image Separation of 2.6 Arc Minutes*

E. L. Turner, D. P. Schneider, B. F. Burke, J. N. Hewitt, G. I. Langston, J. E. Gunn, C. R. Lawrence, and M. Schmidt 1986, *Nature*, **321**, 142.

*The Third Image, the Lens Redshift, and New Components of the Gravitational Lens 2016+112*

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*5 GHz Structure and Optical Identifications of Sources from the MG Survey. II. Maps and Finding Charts*

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*The MIT-Green Bank 5 GHz Survey*

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*Strong Source VLBI Observations at 22 GHz*

C. R. Lawrence, A. C. S. Readhead, R. P. Linfield, D. G. Payne, R. A. Preston, R. T. Schilizzi, R. W. Porcas, R. S. Booth, and B. F. Burke 1985, *Ap. J.*, **296**, 458.

*Deep Optical and Radio Observations of the Gravitational Lens System 2016+112*

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*Infrared Spectrum of Cygnus X-3.*

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*5 GHz Structure and Optical Identifications of Weak Extragalactic Radio Sources.*

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*5 GHz Source Variability and the Gain of the NRAO 300 Foot Telescope.*

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*Radio Interferometric Detection of a Traveling Ionospheric Disturbance Excited by the Explosion of Mount St. Helens.*

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## SELECTED CONFERENCE PRESENTATIONS

*Ongoing and future ground-based and balloon-borne CMB temperature and polarization experiments*

Charles R. Lawrence, CMB and Physics of the Early Universe, ed. L. Denese et al., *Proceedings of Science*, **CMB2006(012)**.

*Millimeter-Wave MMIC Cameras and the QUIET Experiment*

C. R. Lawrence, T. Gaier, & M. Seiffert 2004, IR Space Telescopes and Instruments, ed. J. Zmuidzinas, W. S. Holland, and S. Withington, *Proc. SPIE*, **5498**, p. 220.

*Optimizing cryogen utilization on Spitzer Space Telescope*

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*The low frequency instrument on Planck*

C. R. Lawrence 2003, *New Astronomy Reviews*, **47**, 1025–1032.

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